

CLAIMS

What is claimed is:

- 1 1. An apparatus comprising:
2 a first compensation device compensating for a wavelength
3 dispersion characteristic dependent on wavelength; and
4 a second compensation device compensating for wavelength
5 dispersion, the second compensation device having a constant
6 wavelength dispersion characteristic over a plurality of
7 wavelengths.

- 1 2. An apparatus as in claim 1, further comprising:
2 a housing which houses, and thereby encloses, both the both
3 first and second compensation devices.

- 1 3. An apparatus as in claim 1, further comprising:
2 a substrate on which both the first and second compensation
3 devices are fixed.

- 1 4. An apparatus as in claim 2, further comprising:
2 a substrate on which both the first and second compensation
3 devices are fixed.

- 1 5. An apparatus as in claim 1, wherein
2 an input light is input to the apparatus, the input light
3 being a wavelength division multiplexed (WDM) light including a
4 plurality of signal lights at different wavelengths multiplexed
5 together, and
6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 6. An apparatus as in claim 2, wherein
2 an input light is input to the apparatus, the input light
3 being a wavelength division multiplexed (WDM) light including a
4 plurality of signal lights at different wavelengths multiplexed
5 together, and
6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 7. An apparatus as in claim 3, wherein
2 an input light is input to the apparatus, the input light
3 being a wavelength division multiplexed (WDM) light including a
4 plurality of signal lights at different wavelengths multiplexed
5 together, and
6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 8. An apparatus as in claim 4, wherein
2 an input light is input to the apparatus, the input light
3 being a wavelength division multiplexed (WDM) light including a
4 plurality of signal lights at different wavelengths multiplexed
5 together, and
6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 9. An apparatus as in claim 1, wherein an amount of
2 compensation of the first compensation device and an amount of
3 compensation of the second compensation device are set so that a
4 sum of compensation provided by the first and second compensation
5 devices is substantially equal to an amount of dispersion of an

6 optical transmission line for which the first and second
7 compensation devices provide compensation.

1 10. An apparatus as in claim 5, wherein an amount of
2 compensation of the first compensation device and an amount of
3 compensation of the second compensation device are set so that a
4 sum of compensation provided by the first and second compensation
5 devices is substantially equal to an amount of dispersion of an
6 optical transmission line for which the first and second
7 compensation devices provide compensation.

1 11. An apparatus as in claim 1, wherein the first
2 compensation device is a dispersion compensating fiber and the
3 second compensation device is a virtually imaged phased array
4 (VIPA) type dispersion compensator.

1 12. An apparatus as in claim 1, wherein the second
2 compensation device is a virtually imaged phased array (VIPA)
3 type dispersion compensator.

1 13. An apparatus comprising:
2 first means for compensating for a wavelength dispersion
3 characteristic dependent on wavelength; and
4 second means for compensating for wavelength dispersion, the
5 second means having a constant wavelength dispersion
6 characteristic over a plurality of wavelengths.

1 14. An apparatus comprising:
2 a first compensation device compensating for a wavelength
3 dispersion characteristic dependent on wavelength; and

4 a second compensation device compensating for wavelength
5 dispersion, the second compensation device having a variable
6 wavelength dispersion characteristic.

1 15. An apparatus as in claim 14, further comprising:
2 a housing which houses, and thereby encloses, both the both
3 first and second compensation devices.

1 16. An apparatus as in claim 14, further comprising:
2 a substrate on which both the first and second compensation
3 devices are fixed.

1 17. An apparatus as in claim 15, further comprising:
2 a substrate on which both the first and second compensation
3 devices are fixed.

1 18. An apparatus as in claim 14, wherein
2 an input light is input to the apparatus, the input light
3 being a wavelength division multiplexed (WDM) light including a
4 plurality of signal lights at different wavelengths multiplexed
5 together, and
6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 19. An apparatus as in claim 15, wherein
2 an input light is input to the apparatus, the input light
3 being a wavelength division multiplexed (WDM) light including a
4 plurality of signal lights at different wavelengths multiplexed
5 together, and

6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 20. An apparatus as in claim 16,
2 an input light is input to the apparatus, the input light
3 being a wavelength division multiplexed (WDM) light including a
4 plurality of signal lights at different wavelengths multiplexed
5 together, and

6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 21. An apparatus as in claim 17, wherein
2 an input light is input to the apparatus, the input light
3 being a wavelength division multiplexed (WDM) light including a
4 plurality of signal lights at different wavelengths multiplexed
5 together, and

6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 22. An apparatus as in claim 14, wherein an amount of
2 compensation of the first compensation device and an amount of
3 compensation of the second compensation device are set so that a
4 sum of compensation provided by the first and second compensation
5 devices is substantially equal to an amount of dispersion of an
6 optical transmission line for which the first and second
7 compensation devices provide compensation.

1 23. An apparatus as in claim 18, wherein an amount of
2 compensation of the first compensation device and an amount of
3 compensation of the second compensation device are set so that a

4 sum of compensation provided by the first and second compensation
5 devices is substantially equal to an amount of dispersion of an
6 optical transmission line for which the first and second
7 compensation devices provide compensation.

1 24. An apparatus as in claim 14, wherein the first
2 compensation device is a dispersion compensating fiber and the
3 second compensation device is a virtually imaged phased array
4 (VIPA) type dispersion compensator.

1 25. An apparatus as in claim 14, wherein the second
2 compensation device is a virtually imaged phased array (VIPA)
3 type dispersion compensator.

1 26. An apparatus comprising:
2 first means for compensating for dispersion slope of an
3 optical transmission line, the first means having a wavelength
4 dispersion characteristic dependent on wavelength; and
5 second means for compensating for wavelength dispersion of
6 the optical transmission line, the second means having a variable
7 wavelength dispersion characteristic.

1 27. An apparatus comprising:
2 a fiber type compensation device compensating for wavelength
3 dispersion and dispersion slope of an optical transmission line;
4 and
5 a virtually imaged phased array (VIPA) type compensation
6 device compensating for a sum of the wavelength dispersion of the
7 optical transmission line and the wavelength dispersion
8 compensation of the fiber type compensation device.

1 28. An apparatus as in claim 27, wherein said sum indicates
2 negative wavelength dispersion, and the VIPA type compensation
3 device has positive wavelength dispersion which cancels at least
4 a part of the negative wavelength dispersion.

1 29. An apparatus as in claim 27, further comprising:
2 a housing which houses, and thereby encloses, both the fiber
3 type compensation device and the VIPA type compensation device.

1 30. An apparatus as in claim 27, further comprising:
2 a substrate on which both the fiber type compensation device
3 and the VIPA type compensation device are fixed.

1 31. An apparatus as in claim 28, further comprising:
2 a substrate on which both the fiber type compensation device
3 and the VIPA type compensation device are fixed.

1 32. An apparatus as in claim 27, wherein
2 an input light travels through the optical transmission
3 line, the input light being a wavelength division multiplexed
4 (WDM) light including a plurality of signal lights at different
5 wavelengths multiplexed together, and
6 the fiber type compensation device and the VIPA type
7 compensation device compensate a wavelength range of the input
8 light.

1 33. An apparatus as in claim 28, wherein
2 an input light travels through the optical transmission
3 line, the input light being a wavelength division multiplexed

4 (WDM) light including a plurality of signal lights at different
5 wavelengths multiplexed together, and
6 the fiber type compensation device and the VIPA type
7 compensation device compensate a wavelength range of the input
8 light.

1 34. An apparatus as in claim 29, wherein
2 an input light travels through the optical transmission
3 line, the input light being a wavelength division multiplexed
4 (WDM) light including a plurality of signal lights at different
5 wavelengths multiplexed together, and
6 the fiber type compensation device and the VIPA type
7 compensation device compensate a wavelength range of the input
8 light.

1 35. An apparatus as in claim 30, wherein
2 an input light travels through the optical transmission
3 line, the input light being a wavelength division multiplexed
4 (WDM) light including a plurality of signal lights at different
5 wavelengths multiplexed together, and
6 the fiber type compensation device and the VIPA type
7 compensation device compensate a wavelength range of the input
8 light.

1 36. An optical transmission system comprising:
2 an optical transmission line;
3 a first compensation device compensating for dispersion
4 slope of the optical transmission line, the first compensation
5 device having a wavelength dispersion characteristic dependent on
6 wavelength; and

7 a second compensation device compensating for wavelength
8 dispersion of the optical transmission line, the second
9 compensation device having a constant wavelength dispersion
10 characteristic over a plurality of wavelengths.

1 37. An apparatus as in claim 36, further comprising:
2 a housing which houses, and thereby encloses, both the both
3 first and second compensation devices.

1 38. An apparatus as in claim 36, further comprising:
2 a substrate on which both the first and second compensation
3 devices are fixed.

1 39. An apparatus as in claim 37, further comprising:
2 a substrate on which both the first and second compensation
3 devices are fixed.

1 40. An apparatus as in claim 36, wherein
2 an input light travels through the optical transmission
3 line, the input light being a wavelength division multiplexed
4 (WDM) light including a plurality of signal lights at different
5 wavelengths multiplexed together, and
6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 41. An apparatus as in claim 38, wherein
2 an input light travels through the optical transmission
3 line, the input light being a wavelength division multiplexed
4 (WDM) light including a plurality of signal lights at different
5 wavelengths multiplexed together, and

6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 42. An apparatus as in claim 39, wherein
2 an input light travels through the optical transmission
3 line, the input light being a wavelength division multiplexed
4 (WDM) light including a plurality of signal lights at different
5 wavelengths multiplexed together, and
6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 43. An apparatus as in claim 36, wherein an amount of
2 compensation of the first compensation device and an amount of
3 compensation of the second compensation device are set so that a
4 sum of compensation provided by the first and second compensation
5 devices is substantially equal to an amount of dispersion of the
6 optical transmission line.

1 44. An apparatus as in claim 37, wherein an amount of
2 compensation of the first compensation device and an amount of
3 compensation of the second compensation device are set so that a
4 sum of compensation provided by the first and second compensation
5 devices is substantially equal to an amount of dispersion of the
6 optical transmission line.

1 45. An apparatus as in claim 36, wherein the first
2 compensation device is a dispersion compensating fiber and the
3 second compensation device is a virtually imaged phased array
4 (VIPA) type dispersion compensator.

1 46. An apparatus as in claim 36, wherein the second
2 compensation device is a virtually imaged phased array (VIPA)
3 type dispersion compensator.

1 47. An apparatus as in claim 37, wherein the second
2 compensation device is a virtually imaged phased array (VIPA)
3 type dispersion compensator.

1 48. An apparatus as in claim 38, wherein the second
2 compensation device is a virtually imaged phased array (VIPA)
3 type dispersion compensator.

1 49. An apparatus as in claim 36, further comprising:
2 a transmission device transmitting light to the optical
3 transmission line to travel through the optical transmission
4 line; and
5 a reception device receiving the light from the optical
6 transmission line.

1 50. An apparatus as in claim 36, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:
4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 51. An apparatus as in claim 37, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 52. An apparatus as in claim 38, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 53. An apparatus as in claim 39, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 54. An apparatus as in claim 40, further comprising:
2 a reception device receiving the input light from the
3 optical transmission line, the second compensation device being
4 in the reception device.

1 55. An apparatus as in claim 41, further comprising:
2 a reception device receiving the input light from the
3 optical transmission line, the second compensation device being
4 in the reception device.

1 56. An apparatus as in claim 42, further comprising:

2 a reception device receiving the input light from the
3 optical transmission line, the second compensation device being
4 in the reception device.

1 57. An apparatus as in claim 43, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 58. An apparatus as in claim 44, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 59. An apparatus as in claim 45, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 60. An apparatus as in claim 46, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 61. An apparatus as in claim 47, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 62. An apparatus as in claim 48, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 63. An optical transmission system comprising:
2 an optical transmission line;
3 a first compensation device compensating for dispersion
4 slope of the optical transmission line, the first compensation
5 device having a wavelength dispersion characteristic dependent on
6 wavelength; and

7 a second compensation device compensating for wavelength
8 dispersion of the optical transmission line, the second
9 compensation device having a variable wavelength dispersion
10 characteristic.

1 64. An apparatus as in claim 63, further comprising:

2 a housing which houses, and thereby encloses, both the both
3 first and second compensation devices.

1 65. An apparatus as in claim 63, further comprising:
2 a substrate on which both the first and second compensation
3 devices are fixed.

1 66. An apparatus as in claim 64, further comprising:
2 a substrate on which both the first and second compensation
3 devices are fixed.

1 67. An apparatus as in claim 63, wherein
2 an input light travels through the optical transmission
3 line, the input light being a wavelength division multiplexed
4 (WDM) light including a plurality of signal lights at different
5 wavelengths multiplexed together, and
6 the first and second compensation devices compensate a
wavelength range of the input light.

1 68. An apparatus as in claim 64, wherein
2 an input light travels through the optical transmission
3 line, the input light being a wavelength division multiplexed
4 (WDM) light including a plurality of signal lights at different
5 wavelengths multiplexed together, and
6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 69. An apparatus as in claim 65, wherein
2 an input light travels through the optical transmission
3 line, the input light being a wavelength division multiplexed

4 (WDM) light including a plurality of signal lights at different
5 wavelengths multiplexed together, and
6 the first and second compensation devices compensate a
7 wavelength range of the input light.

1 70. An apparatus as in claim 63, wherein an amount of
2 compensation of the first compensation device and an amount of
3 compensation of the second compensation device are set so that a
4 sum of compensation provided by the first and second compensation
5 devices is substantially equal to an amount of dispersion of the
6 optical transmission line.

1 71. An apparatus as in claim 64, wherein an amount of
2 compensation of the first compensation device and an amount of
3 compensation of the second compensation device are set so that a
4 sum of compensation provided by the first and second compensation
5 devices is substantially equal to an amount of dispersion of the
6 optical transmission line.

1 72. An apparatus as in claim 63, wherein the first
2 compensation device is a dispersion compensating fiber and the
3 second compensation device is a virtually imaged phased array
4 (VIPA) type dispersion compensator.

1 73. An apparatus as in claim 63, wherein the second
2 compensation device is a virtually imaged phased array (VIPA)
3 type dispersion compensator.

1 74. An apparatus as in claim 64, wherein the second
2 compensation device is a virtually imaged phased array (VIPA)
3 type dispersion compensator.

1 75. An apparatus as in claim 65, wherein the second
2 compensation device is a virtually imaged phased array (VIPA)
3 type dispersion compensator.

1 76. An apparatus as in claim 63, further comprising:
2 a transmission device transmitting light to the optical
3 transmission line to travel through the optical transmission
4 line; and
5 a reception device receiving the light from the optical
6 transmission line.

1 77. An apparatus as in claim 63, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:
4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 78. An apparatus as in claim 64, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:
4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 79. An apparatus as in claim 65, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 80. An apparatus as in claim 66, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 81. An apparatus as in claim 67, further comprising:
2 a reception device receiving the input light from the
3 optical transmission line, the second compensation device being
4 in the reception device.

1 82. An apparatus as in claim 68, further comprising:
2 a reception device receiving the input light from the
3 optical transmission line, the second compensation device being
4 in the reception device.

1 83. An apparatus as in claim 69, further comprising:
2 a reception device receiving the input light from the
3 optical transmission line, the second compensation device being
4 in the reception device.

1 84. An apparatus as in claim 70, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 85. An apparatus as in claim 71, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 86. An apparatus as in claim 72, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 87. An apparatus as in claim 73, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 88. An apparatus as in claim 74, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 89. An apparatus as in claim 75, wherein light travels
2 through the optical transmission line, the apparatus further
3 comprising:

4 a reception device receiving the light from the optical
5 transmission line, the second compensation device being in the
6 reception device.

1 90. A method comprising:
2 compensating for dispersion slope of a wavelength dispersion
3 characteristic dependent on wavelength; and
4 compensating for wavelength dispersion of a constant
5 wavelength dispersion characteristic over a plurality of
6 wavelengths.

1 91. A method comprising:
2 compensating for dispersion slope of a wavelength dispersion
3 characteristic dependent on wavelength; and
4 compensating for wavelength dispersion of a variable
5 wavelength dispersion characteristic.